(No Model.)

W. B. POTTER.

SURFACE CONTACT RAILWAY SYSTEM.

No. 589,791. Patented Sept. 7, 1897.

FIG. 1.

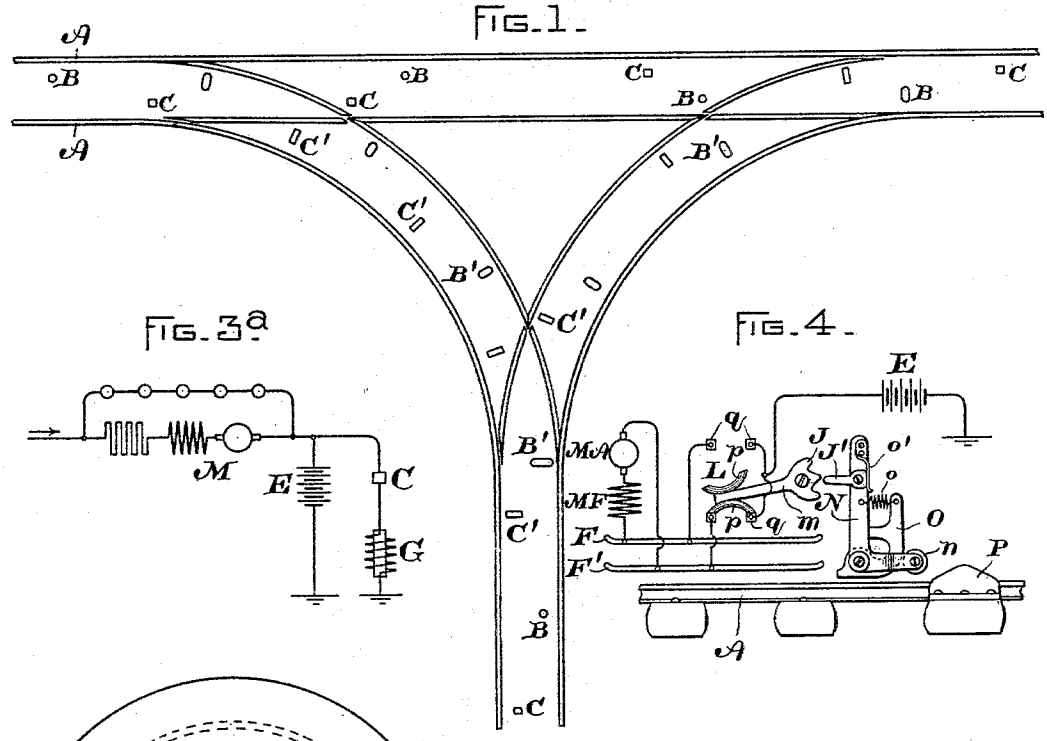


FIG. 3a.

FIG. 4.

FIG. 2.

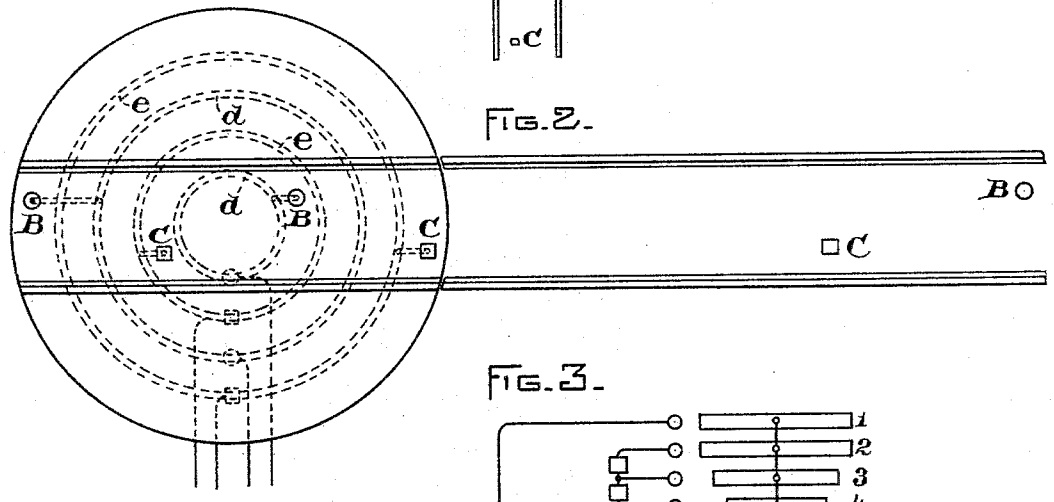
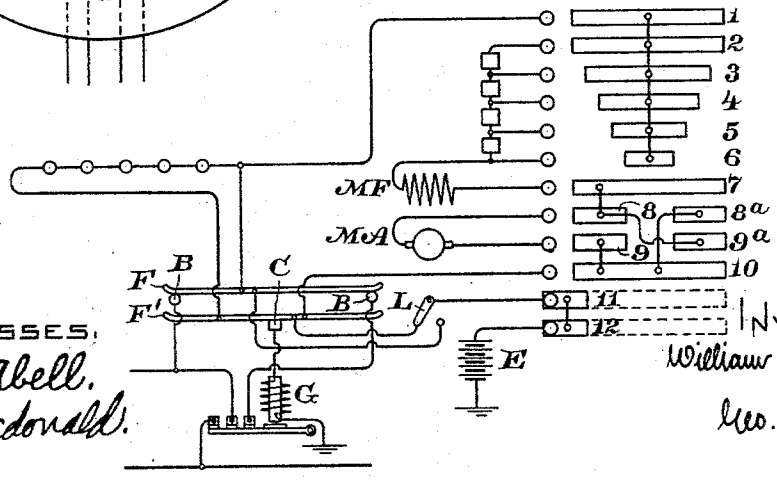


FIG. 3.



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UNITED STATES PATENT OFFICE.

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SURFACE-CONTACT RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 589,791, dated September 7, 1897.

Application filed January 25, 1897. Serial No. 620,566. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. POTTER, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Surface-Contact Railway Systems, (Case No. 477,) of which the following is a specification.

My invention relates to surface-contact electric-railway systems, and has for its object to provide means for reversing the car at the end of its route without giving rise to the difficulties which may otherwise arise from the reversal of the sliding contacts.

It also has for its object to provide an efficient means of effecting the reversal of the car without a turn-table by the use of a Y equipped with suitable surface contacts.

Another object of my invention is to provide a suitable controller for use in the systems just pointed out so arranged that the lighting-circuit of the car may be kept intact.

Another object of my invention is to provide means for reversing the sliding contacts to accord with the direction of motion of the car, and also to provide mechanical means operated automatically for effecting this reversal.

To effect the objects pointed out, I provide a Y with surface contacts of peculiar shape so spaced that the car may be operated in either direction. On the straight part of the Y (preferably) I leave a dead-space over which the car may coast. During this coasting or "drifting," as it is sometimes called, a switch is to be thrown, which I arrange, preferably, accessible to the motorman, acting to reverse the connection of the sliding contacts or shoes commonly provided in such systems with reference to the storage battery, also commonly used, so that the battery is maintained on the ground side of the system. Although the motors are connected between the shoes, it is not necessary to reverse their connections, inasmuch as they are series machines and operate in the same direction whichever way the current may be passing through them. I also provide a controller having contacts at its normal or off position. These contacts are so arranged that they complete the circuit of the storage battery, ordinarily used as a pick-up device, thus holding up the switch or switches over which the car may happen to be, so that current passes to the contact-shoes and thus over the shunt-circuit containing the lights.

To effect another object of my invention, I so arrange the switch designed to reverse the battery connections that it may be thrown automatically by the momentum of the car in the dead-space. I do not in this application, however, claim particularly the operation of the switch for the purpose named automatically or electromagnetically, this not being of my invention, but I believe myself entitled to a broad claim for the automatic mechanical operation of the switch.

The accompanying drawings show diagrammatic arrangements for accomplishing the purposes named, Figure 1 being a plan view of a Y for turning the car equipped with surface contacts, Fig. 2 showing how a turn-table may be substituted. Fig. 3 is a diagram of a suitable controller, which is not, however, the only type that may be employed. Fig. 3ª is a diagram of the circuits. Fig. 4 shows a mechanical device for throwing the battery-switch.

In Fig. 1, A A are the track-rails; B B, the "high-potential" studs; C C, the "low-potential" studs, (using these terms to distinguish between studs from which the motor takes current and those to which the current passes after leaving the motor.) On the curved portions of the Y other studs of peculiar form are indicated. B′ B′ are the high-potential studs in this construction. These are of greater width than those on the straight part of the track. C′ C′ are similar low-potential studs. As the car passes around the curve the contact-shoes tend to move laterally, and this lateral extension of the contacts or studs insures the proper electrical connection being made.

In Fig. 2 I show a turn-table as a means of effecting the reversal of the car. On the top of the turn-table are high-potential studs B B and low-potential ones C C. The high-potential studs are connected to suitable permanent contacts placed beneath the turn-ta-

ble (and indicated in dotted lines) by contact-rings *d d* and the low-potential studs by contact-rings *e e*. I do not claim, however, the use of a turn-table having suitable connections to effect the reversal of the car in a surface-contact system, but simply illustrate this as one construction in which my invention may be employed.

In Fig. 3 I illustrate the controller which I have devised. I have shown a resistance-controller in which the revolution of the motors will be in opposite directions according to the direction in which the handle of the controller may be turned, this being a well-known type and being selected merely for illustrative purposes, as I might substitute a series-parallel or other form of controller. The operation of resistance-contacts is so well known that it will be unnecessary to trace the circuits, except that the current enters from the trolley-circuit, passing from the shoe F directly to the first contact of the controller, then through the resistance, the motor-field MF, the motor-armature MA, and to the other shoe F′. Thence it passes through the switch G, holding up that switch during the normal operation of the car. Additional contacts 11 and 12 are provided, with which the storage battery E is in circuit. Leads go to the two shoes F F′, and a switch L is provided, by which one end of the storage battery may be connected to one or the other of the two shoes. This switch is a particular feature of the invention. The operation of this part of the controller is as follows: When the controller is brought to the off position, so that the trolley-circuit is interrupted, the battery is switched in and sends current through the switch G to ground, holding up the switch, (the circuit being thus completed to the other side of the battery, which is also grounded,) and thus sending the line-circuit in the illustrated position through the shoe F and the lighting-circuit to the shoe F′. If the car were reversed, however, by the means shown in Figs. 1 and 2 or other suitable means, the shoe F, which is now in contact with the high-potential studs, would be brought to the low-potential side; but the battery, being left on the shoe F′, would get the full potential of the motor-current and be destroyed. When the car is reversed, therefore, the switch L is thrown, connecting the battery to the other shoe F, which has now become the low-potential or negative shoe. The battery is thus connected in multiple with the switch-coils and serves to pick up in the ordinary way, and also serves, as just described, to hold up one of the switches in the off position. The motor and the lights being connected between the two shoes the direction of current through them is immaterial.

In Fig. 4 I show the mechanical device which I have found useful for throwing the switch L. In this figure, A is the track-rail, as before. Adjacent to the track I arrange a cam P. The switch L is mounted on a lever *m*, having a cam movement J. The pivoted bell-crank lever N is provided with a finger J′, registering with the notches upon each side of the cam part J of the lever *m*. The lever L has bridging contacts *p*, and the two sets of contacts *q q* coöperate with it to establish the circuit relations of the storage battery. At O is shown a projection which may be fixed in any convenient way to the truck, and a spring *o* is provided between the lever N and the projection, another spring *o′* maintaining the finger J′ in proper position. A friction-roller *n* is provided upon the end of the bell-crank lever N. The operation of this device is as follows: When the car passes, the roller *n* strikes the cam P in the track and lifts, throwing the lever N so that the finger J′ strikes the lower notch of the cam part J of the lever *m*, thus bridging the contacts *q* with the contact *p*. When the car moves in the other direction, the reverse operation takes place, the finger J′ then registering with the upper notch in the cam J.

So far as I am aware I am the first to provide means in a surface-contact railway system for maintaining the lighting-circuit when the motor-current is interrupted, and I am also the first to provide means for shifting the battery from one shoe to the other when the car is reversed and to effect this reversal of the battery connections by mechanical automatic means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a surface-contact railway system, provided with a car having a storage battery and contact-shoes, means for turning the car, in combination with means for reversing the connection of the storage battery to the contact-shoes.

2. In a surface-contact railway system, provided with a car having a storage battery and contact-shoes, means for turning the car, in combination with automatic mechanical means for reversing the connection of the storage battery with the contact-shoes.

3. In a surface-contact railway system, a controlling device provided with contacts for regulating the motors and auxiliary contacts at its normal off position, and connections from the latter contacts to the storage battery, by which the storage battery preserves the connection of the lighting-circuit of the car to the surface contacts when the motor-circuit is interrupted.

4. In a surface-contact railway system, motors, a lighting-circuit, sliding contacts coöperating with electromagnetic switches for connecting up the working conductors, a storage battery, and a controlling device the contacts and connections of which are adapted to operate the motors in the ordinary positions of the controller, and to maintain the storage battery in circuit to operate the electromagnetic switches at the normal off position of

the controller; whereby one or more of the road-switches may be maintained closed for preserving the lighting-circuit intact when the motor-circuit is interrupted.

5. In a surface-contact electric-railway system, having a car provided with a storage battery, motors and sliding contacts, a controlling device having a normal off position in which the motor-current is interrupted, and contacts at such normal off position for maintaining the storage battery in circuit to keep the trolley-circuit alive while the motor-circuit is interrupted.

6. In a surface-contact railway system, having a car provided with motors, a storage battery, and sliding contacts, a controlling device having a normal off position in which the motor-circuit is interrupted, with auxiliary contacts at such off position for maintaining the circuit of the storage battery so as to keep the trolley-circuit alive while the motor-circuit is interrupted; in combination with a switch for rendering such auxiliary contacts useful or idle at will.

7. In a surface-contact railway system, a reversing-switch or Y for reversing the car, having a dead or drifting space provided with no surface contacts, and with curved portions provided with surface contacts having greater width than the ordinary studs or contacts of the road.

8. A Y for reversing the cars in a surface-contact railway system, having curved portions provided with studs of greater width than those used in the straight parts of the road.

In witness whereof I have hereunto set my hand this 11th day of January, 1897.

WILLIAM B. POTTER.

Witnesses:
B. B. HULL,
M. H. EMERSON.